



DAM SAFETY GUIDELINES

Part I:

General Information & Owner Responsibilities

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DAM SAFETY GUIDELINES

PART I

GENERAL INFORMATION AND OWNER RESPONSIBILITIES

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GENERAL INFORMATION AND OWNER RESPONSIBILITIES

1. INTRODUCTION

The Dam Safety Guidelines are intended to provide dam owners, operators, and design engineers with information on activities, procedures, and requirements involved in the planning, design, construction, operation, and maintenance of dams in the State of Washington. In particular, they provide guidance in meeting the requirements identified in the Dam Safety Regulations Chapter 173-175 WAC. For convenience of the various expected users, the guidelines have been organized into four basic units entitled:

- Part I - General Information and Owner Responsibilities**
- Part II - Project Planning & Approval of Dam Construction or Modification**
- Part III - An Owner's Guidance Manual**
- Part IV - Dam Design and Construction**

Technical Notes have also been prepared to provide detailed technical information on engineering design and analysis of various project elements. For clarity, all important definitions and terms pertinent to State of Washington dam safety activities are summarized in Appendix A of Part IV.

Part I of the guidelines contains general information about statutory authority, dam safety activities, and dam owner responsibilities for completed projects.

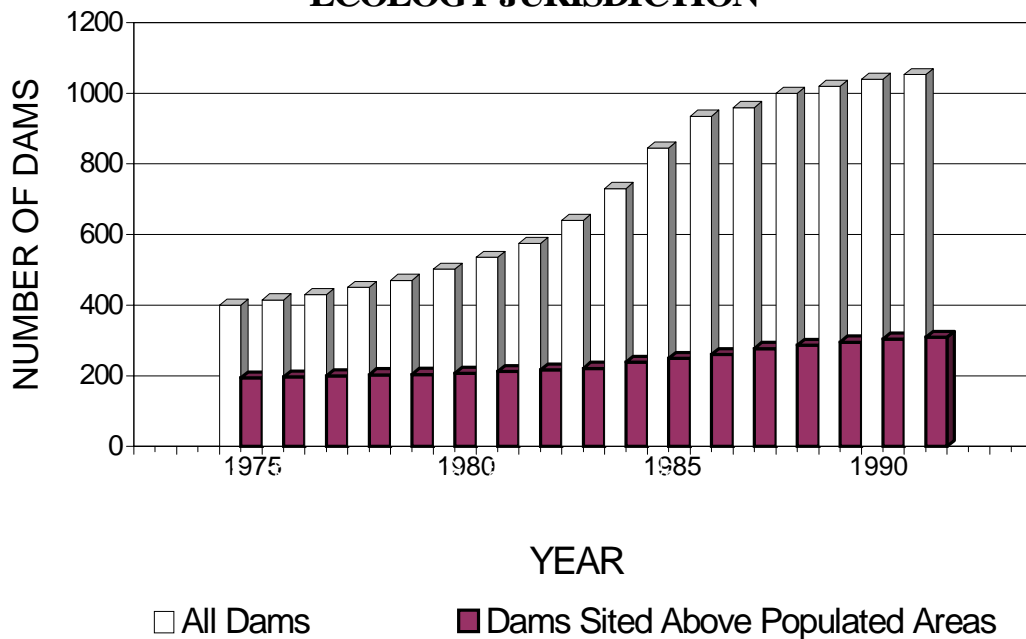
2. DAM SAFETY IN WASHINGTON

2.1 CHARACTERISTICS OF DAMS IN WASHINGTON

There are currently 1,100 dams in the State of Washington that are regulated by the Dam Safety Office (DSO). This number continues to increase as 15 to 20 new dams are constructed each year (Figure 1). About 310 (28%) of the 1,100 dams under Ecology jurisdiction are located above populated areas (Figure 2), and are therefore classified as having high or significant downstream hazards. This number also continues to increase as new dams are built and development continues to occur downstream of existing dams.

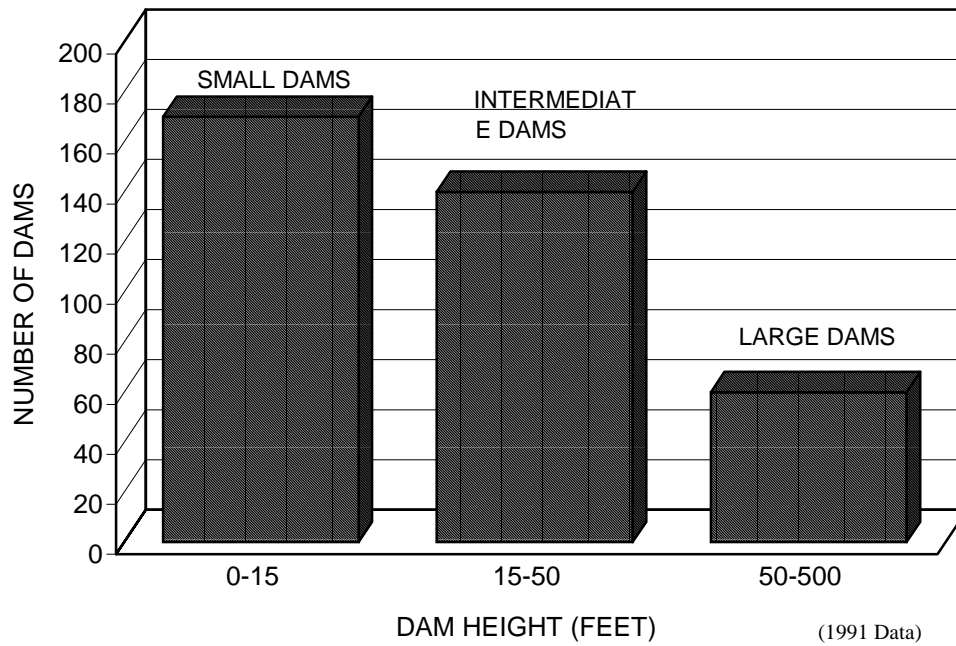
These dams have been built for a variety of purposes including: irrigation water supply; domestic water supply; recreation; waste water treatment or storage; flood control; mine tailings storage; and hydropower production. While irrigation and recreation currently account for the majority of facilities, dams have been built for a wide range of purposes (Figure 3). This diversity in project purposes in combination with the many geologic and hydrologic settings found in the state poses a variety of operational and engineering design considerations.

**FIGURE 1
DAMS SOLELY UNDER
ECOLOGY JURISDICTION**

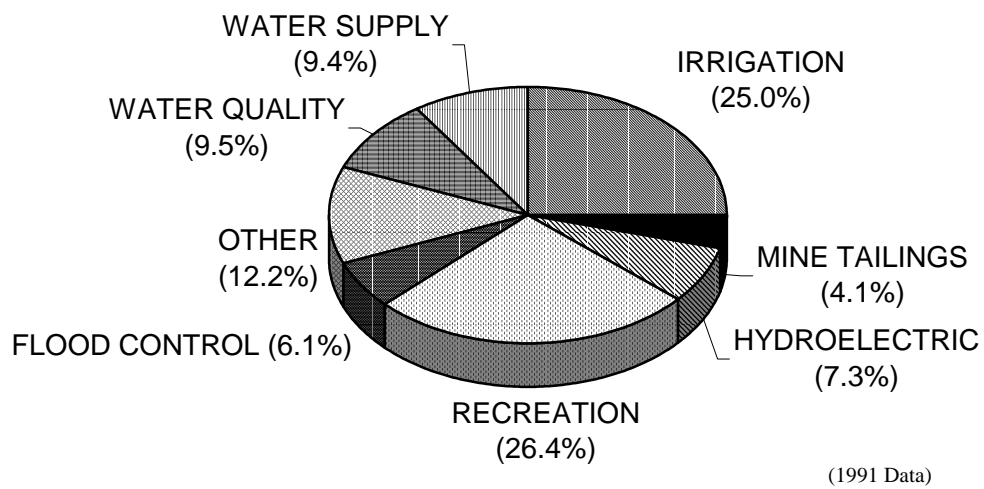


(1991 Data)

**FIGURE 2
DAMS SITED ABOVE POPULATED AREAS
IN WASHINGTON STATE**



**FIGURE 3
TYPES OF DAMS
UNDER ECOLOGY JURISDICTION**



2.2 DAM SAFETY - STATUTORY AUTHORITY AND PURPOSE

The authority and responsibility to regulate dams in Washington and to provide for public safety is contained in the following laws:

- State Water Code (1917) - Chapter 90.03 RCW
- Flood Control Act (1935) - Chapter 86.16 RCW
- Department of Ecology (1970) - Chapter 43.21A RCW

Where water projects involve dams and reservoirs with a storage volume of 10 acre-feet or more, provisions were made in the laws for the engineering review of the construction plans and specifications, for the inspection of dams, and for requiring remedial action, as necessary, to reasonably secure proper operation, maintenance, and continued safe performance. As part of its administrative charge, the Washington State Department of Ecology (Ecology) is the agency of state government vested with the authority and responsibility to perform these functions.

A listing of these statutes in the Revised Code of Washington (RCW) and pertinent sections of the Washington Administrative Code (WAC) are provided in Appendix A and are summarized below.

2.2.1 RCW 43.21A.064(2) - Powers and Duties (Synopsis)

The Department of Ecology has powers and duties, insofar as it may be necessary to assure safety to life or property, to inspect the construction of all dams, and to require necessary changes in construction or maintenance.

2.2.2 RCW 86.16.035 - Control of Dams and Obstructions (Synopsis)

The Department of Ecology shall have supervision and control over all dams and obstructions in streams and may make regulations concerning the flow of water, as necessary, for the protection of life and property below these works from flood waters.

2.2.3 RCW 90.03.350 - Plans and Specifications (Synopsis)

Anyone intending to construct or modify any dam or controlling works for the storage of 10 acre-feet or more of water shall submit plans and specifications thereof to the Department of Ecology for approval as to safety. Any dam not constructed according to approved plans and specifications or not maintained as may be ordered, shall be presumed to be a public nuisance and may be abated.

2.2.4 RCW 90.03.470(8),(9) - Fees for Inspection, Plan Review (Synopsis)

Fees are required for the review of construction plans and specifications and for construction inspections. Fees for review of construction plans and specifications are based on actual costs or a minimum of ten dollars. Fees for construction inspection are to be based on actual costs.

2.2.5 WAC 173-175 - Dam Safety Regulations (Synopsis)

The Dam Safety Regulations provide for the design, construction, operation, maintenance, inspection, and supervision of dams in a manner consistent with accepted engineering practice. These regulations:

- Designate the types of dams to which regulations are applicable.
- Establish and administer a program for permitting of construction work for new dams and for modifications of existing dams.
- Establish a fee schedule based on dam size that reflects the actual cost to the department of engineering review of plans and specifications and for construction inspections.
- Establish the requirements and owner responsibilities for developing and executing plans for Operation and Maintenance, and Emergency Actions.
- Encourage dam owners to establish a program for the periodic inspection of their projects.
- Require Ecology to develop and maintain engineering guidelines for the purpose of aiding dam owners and project engineers in developing design reports, construction plans, operation and emergency plans, and conducting dam inspections.

2.3 DAM SAFETY FUNCTIONS

In order to carry out the foregoing statutory responsibilities and associated activities, the Dam Safety Office (DSO) was established within the Water Resources Program of the Department of Ecology. The DSO acts in the interest of general public safety, by providing reasonable assurance that impoundment facilities will function adequately and not pose a threat to lives and property. It is emphasized, however, that dam owners are primarily responsible for the safety of their structures and this is achieved through proper design, construction, operation, and maintenance of their facilities.

The Dam Safety Office neither advocates nor opposes the construction and operation of dams. The DSO regulates dams with the sole purpose of reasonably securing public safety. Environmental and natural resource issues are addressed by other governmental units through separate regulations and/or permits.

The following is a brief description of the basic functions performed by the Dam Safety Office:

2.3.1 Plan Review and Approval

To reasonably assure adequacy of design, engineering design reports, and construction plans and specifications for dams and appurtenant works are examined and approved in accordance with statutory requirements and accepted engineering practice. Plan review is required for all projects with an impounding capability of 10 acre-feet or more at the dam crest level. A Construction Permit is issued when the construction plans and specifications, and Construction Inspection Plan have been found to be acceptable and upon payment of applicable plan review fees. Copies of all

approved plans are retained on file in the Dam Safety Office.

The Dam Safety Office also reviews Operation and Maintenance (O&M) Plans and Emergency Action Plans. An O&M Plan is required for all projects and is used to develop an O&M Manual following completion of the project. An Emergency Action Plan is required for those projects where a failure of the dam could pose a threat to life. Both plans must be submitted for review prior to startup or resumption of project operations following construction (see Section 3 for more details on O&M and Emergency Action Plans).

2.3.2 Construction Inspection

Construction inspections are performed to verify that the field conditions encountered are compatible with the conditions assumed in design and that the construction is proceeding in accordance with the approved plans, specifications, and construction inspection plan. Particular emphasis is placed on observing and documenting the construction of elements which are critical to the safe performance of the facility. The frequency of DSO site inspections are commensurate with the size and complexity of the project.

2.3.3 Periodic Inspection

Periodic inspections are conducted on existing dams that are located in areas where dam failure and release of the reservoir contents could pose the potential for loss of life. The inspections are intended to identify deficiencies, and to reasonably assure safe operation and confirm that maintenance is being adequately performed. The inspections are performed by professional engineers from the DSO and involves: a detailed inspection of all features of the project; engineering analysis of critical project elements under extreme flood and earthquake loadings; and preparation of a comprehensive report of the findings. This report includes a description of the analyses, findings from the inspection, and any required remedial work to be performed.

2.3.4 Compliance and Enforcement

Enforcement actions are taken as necessary to secure compliance with safety requirements and to correct identified deficiencies. The compliance and enforcement activity involves a variety of possible actions including restrictions on reservoir operation, draining of the reservoir, assessment of fines, and court actions. When a dam owner is not responsive in correcting deficiencies, the dam may be declared a public nuisance and removed through an abatement proceeding in Superior Court.

2.3.5 Records and Inventory

Records of all activities associated with a project, including design reports, plans and specifications, inspection reports, and correspondence, are retained on file with the DSO. As a basic source of information on the physical characteristics of projects, a computerized inventory is maintained in the Dam Safety Office for all dams in the state.

3. OWNER RESPONSIBILITIES FOR COMPLETED PROJECTS

It is the responsibility of dam owners to operate and maintain their dam(s) in a safe manner and condition and to notify the Dam Safety Office (DSO) when modifications to the dam are proposed or unusual or unsafe circumstances occur. The following sections list responsibilities of the dam owner and identify activities that require review, approval or acceptance by the Dam Safety Office.

3.1 PROJECT OPERATION AND MAINTENANCE

Dam owners are required to develop and maintain an Operation and Maintenance (O&M) Manual. An O&M Manual describes procedures for the operation of the project under normal and extreme reservoir inflow conditions and provides technical guidance and procedures for monitoring, inspection, and long term maintenance. Proper attention to project operation and maintenance is critical for ensuring the continued safe functioning of the dam, and continued productive use of the dam and reservoir.

Dams Constructed Before July 1, 1992 - For dams constructed before July 1, 1992, owners are required to develop an O&M *Manual* by December 31, 1997. For those dams whose failure could pose a threat to life, owners are required to submit the O&M Manual to the DSO for review and acceptance.

Dams Constructed After July 1, 1992 - For dams constructed after July 1, 1992, owners are required to submit an Operation and Maintenance *Plan* to the DSO for review and acceptance prior to startup of project operations following construction (see Section 2.3.1 and *Part II, Dam Safety Guidelines* for information on the Construction Permit process). The O&M *Plan* presents an outline of how the facility is to be operated and maintained and is to be later used by the owner to develop detailed procedures for the O&M *Manual*. In addition, DSO personnel will review O&M Manuals during periodic inspections performed by the DSO (see Section 2.3.3 for details of periodic inspections performed by the DSO).

The sophistication of the O&M Manual should be commensurate with the complexity of dam operations. However, as a minimum, an O&M Manual should contain the following information.

- General information about the project and important features.
- Details of how the reservoir and equipment at the dam are to be operated.
- Detailed information and instructions on performing periodic maintenance and upkeep at the dam.
- Information on performing regular surficial inspection of the dam by the owner or the dam operator.
- Information about instrumentation and monitoring, and instructions for monitoring and recording of data.
- Information on procedures for the continued updating of the manual.

Detailed discussions of the above items and a description of the contents of an O&M Manual are contained in Ecology Publication 92-21, Guidelines for Developing Dam Operation and Maintenance

Manuals².

If changes to an existing O&M Manual are proposed which could have an effect on public safety (such as significant changes to project operation), owners are required to submit the proposed changes for review and acceptance prior to implementing the changes.

3.2 CHANGE OF DAM OWNERSHIP

The Dam Safety Office maintains an inventory of information on dams in the state. This inventory includes such information as the dam name, ownership, and physical characteristics of the project. Thus, when a change in dam ownership occurs, the new dam owner is required to notify the DSO within 90 days and identify the personnel responsible for operation and maintenance. This allows the DSO to maintain an up to date inventory on the project characteristics and to correspond with dam owners and operators as necessary.

3.3 INSPECTION

Owners are required to evaluate the safety of their dams and all appurtenant works, and to make modifications, as needed, to reasonably secure safety to life and property.

Owner Conducted Surficial Inspections - Owners are *required* to conduct annual surficial inspections and maintain records of their findings from these inspections. Information to assist owners in performing these inspections can be found in *Chapter 5 of Part III, Dam Safety Guidelines*.

Copies of inspection records must be provided to the DSO upon request. Typical inspection items would include: condition of the dam crest and upstream and downstream dam faces with particular attention to settlement, cracking, slumps or other distress; condition of the outlet works and spillways noting any erosional damage; testing of infrequently used valves, control works, and other hydraulic mechanisms; observation and measurement of seepage, noting location and concurrent reservoir water level; observation and recording of any conditions which are a change from previous inspections.

Owner Initiated Periodic Inspections - Owners are *encouraged* to implement a program for the periodic inspection of their project(s) on a 5-year frequency to be conducted by a professional engineer.

Periodic inspections differ from annual surficial inspections in that: they are performed by a professional engineer; they involve detailed inspection of all features of the project; engineering analysis of critical project elements under extreme flood and earthquake loadings are performed; and a comprehensive report of findings from the periodic inspection and analyses is prepared.

If owners have periodic inspections conducted, they are required to:

- Notify the department when owner initiated periodic inspections are scheduled to allow DSO engineers to participate in the inspection.
- Submit a copy of the engineering report(s) and other documents which contain the findings, conclusions, and recommendations resulting from a periodic inspection within 30 days

following completion of the various documents.

Periodic Inspections Conducted by Ecology - The DSO may elect to conduct periodic inspections of particular projects to reasonably secure safety to life and property. These inspections are performed on dams where there is the potential for loss of life and significant property damage in the event of a dam failure. The DSO will give at least 30 days advance notice of the date of the periodic inspection and advise the owner of any requirements such as gates or valves that are to be operated during the inspection. Owners are encouraged to accompany DSO personnel during these inspections to provide DSO personnel with background information on the project and discuss any deficiencies found during the inspection.

Following the inspection, the DSO will issue a report describing the analyses performed, findings from the inspection, and any remedial work to be performed. There is no charge to owners for these inspections, however, the owner is responsible for paying for any needed remedial work.

Owners are also required to develop an Operation and Maintenance Manual and Emergency Action Plan within 180 days following completion of a periodic inspection conducted by the DSO.

3.4 EMERGENCY ACTION

In those cases where a failure of the dam could pose a threat to life, the owner is required to develop an Emergency Action Plan (EAP). The EAP describes procedures for responding to unusual or emergency situations and procedures for initiating notification or warning of individuals who may be at risk in downstream areas.

Dams Constructed Before July 1, 1992 - For dams constructed before July 1, 1992, owners are required to develop an EAP and submit it to the DSO for review and acceptance by December 31, 1997.

Dams Constructed After July 1, 1992 - For dams constructed after July 1, 1992, owners are required to submit an EAP to the DSO for review and acceptance during the Construction Permit process (see section 2.3.1 and *Part II, Dam Safety Guidelines* for information on the Construction Permit process).

Typically, the EAP should include the following information:

- Notification procedures (preferably in the form of a flow chart) and responsibilities for notifying downstream residents in the event of an impending dam failure.
- A notification list that includes the names and telephone numbers of all affected downstream residents, dam owner and operator, local emergency officials, and appropriate government agencies (including the Dam Safety Office).
- Specific instructions to be followed by responsible parties at the dam site in response to emergencies such as floods, equipment failures, or other unusual events where the situation might lead to dam failure and immediate remedial action can be effective to prevent failure or reduce hazards to downstream residents.

Detailed information on the development of EAPs is contained in Ecology Publication 92-22, Guidelines for Developing Dam Emergency Action Plans³.

Owners are required to coordinate the development of the EAP with representatives from the local Emergency Services staff, the State Department of Community Development, Emergency Management Division, and other appropriate local authorities. Copies of the completed EAP must be provided to the State Emergency Management Division, local Emergency Services, and to the DSO.

Any proposed changes to existing emergency action plans which could have an effect on public safety, must be coordinated with the local Emergency Services staff and be reviewed and accepted by the DSO.

3.5 REPORTING OF INCIDENTS

Owners are required to notify the DSO when problems or conditions arise which may pose a threat to life or property, or threaten the integrity of the dam. The owner is required to report by telephone to the DSO on any condition affecting the safety of the project or when an incident has occurred. The initial oral report must be made as soon as practicable after the condition is discovered or following any incident. In addition, dam owners are required to notify the DSO prior to resumption of normal reservoir operation following any emergency actions.

The DSO may require that the owner prepare a written report within 30 days following the discovery of the condition or after the incident. The report shall describe the condition affecting the safety of the project or the incident which has occurred, and shall describe the preliminary plans for correcting the condition and for preventing the recurrence of similar incidents.

Examples of incidents that would require notification of the DSO would include:

- Failure or partial failure of gates and valves associated with spillways and outlet works.
- Significant damage associated with an extreme event such as an earthquake or flood.
- Unforeseen facility operations that result in a condition that threatens the structure, dam operators, or lives or property in downstream areas.
- Any significant change in the physical characteristics of the dam, foundation, or outlet works. These could include significant changes in seepage through the embankment or foundation, or the occurrence of slumps or slides on earthen embankments.

3.6 MODIFICATIONS TO EXISTING DAMS

Dam owners are required to submit construction plans and specifications to the DSO for review and approval prior to beginning construction on any structural modification to a dam. A modification is defined as any structural alteration of a dam, its reservoir, spillway(s), outlet(s), or other appurtenant works that could significantly influence or affect the project safety. Modifications do not include activities related to routine maintenance. DSO review and approval is also required for removal or abandonment of a dam.

The Construction Permit process for modification or removal of a dam proceeds through a similar series of activities as for the construction of new dams (see *Part II, Dam Safety Guidelines*). The DSO should be contacted as early in the project development phase as possible, preferably when conceptual plans are developed, to expedite the Dam Safety construction permitting process.

REFERENCES

1. State of Washington, Department of Ecology, Various Statutes and rules related to Water Resources: State Water Code (1917), Chapter RCW 90.03 RCW; Powers and Duties, Department of Ecology, (1970), RCW 43.21A; Flood Control Act (1935), Chapter 86.16 RCW; Dam Safety Regulations, (1992), WAC 173-175; Olympia, WA.
2. State of Washington, Department of Ecology Publication Number 92-21, Guidelines for Developing Dam Operation and Maintenance Manuals, April 1992, Olympia, WA.
3. State of Washington, Department of Ecology Publication Number 92-22, Guidelines for Developing Dam Emergency Action Plans, April 1992, Olympia, WA.

APPENDIX A
STATE STATUTES AND ADMINISTRATIVE RULES
PERTAINING TO DAM SAFETY

Dam Safety Guidelines

Part I:

General Information & Owner Responsibilities

WASHINGTON STATE STATUTES

RCW 43.21A.064 Powers and duties - Water resources.

Subject to RCW 43.21A.068, the director of the department of ecology shall have the following powers and duties:

(2) Insofar as may be necessary to assure safety to life or property, he shall inspect the construction of all dams, canals, ditches, irrigation systems, hydraulic power plants, and all other works, systems and plants pertaining to the use of water, and he may require such necessary changes in the construction or maintenance of said works, to be made from time to time, as will reasonably secure safety to life and property;

RCW 43.21A.068 Federal power act licensees - Exemption from state regulations.

(1) With respect to the safety of any dam, canal, ditch, hydraulic power plant, reservoir, project, or other work, system or plant that requires a license under the federal power act, no licensee shall be required to:

(a) submit proposals, plans, specifications or other documents for approval by the department;

(b) seek a permit, license or other form, permission, or authorization from the department;

(c) submit to inspection by the department; or

(d) change a design, construction, modification, maintenance, or operation of such facilities at the demand of the department.

(2) For the purposes of this section, "licensee" means an owner or operator, or any employee thereof, of a dam, canal, ditch, hydraulic power plant, reservoir, project, or other work, system, or plant that requires a license under the federal power act.

RCW 86.16.035 Department of Ecology - Control of dams and obstructions.

The department of ecology shall have supervision and control over all dams and obstructions in streams, and may make reasonable regulations with respect thereto concerning the flow of water which he deems necessary for the protection to life and property below such works from flood waters.

RCW 90.03.350 Construction or Modification of Storage Dam - Plans and Specifications.

Any person, corporation or association intending to construct or modify any dam or controlling works for the storage of ten acre feet or more of water, shall before beginning said construction or modification, submit plans and specifications of the same to the department for examination and approval as to its safety. Such plans and specifications shall be submitted in duplicate, one copy of which shall be retained as a public record, by the department, and the other returned with its approval or rejection endorsed thereon. No such dam or controlling works shall be constructed or modified until the same or any modification thereof shall have been approved as to its safety by the department. Any such dam or controlling works constructed or modified in any manner other than in accordance with plans and specifications approved by the department or which shall not be maintained in accordance with the order of the department shall be presumed to be a public nuisance and may be abated in the manner provided by law, and it shall be the duty of the attorney general or prosecuting attorney of the county wherein such dam or controlling works, or the major portion thereof, is situated to institute abatement proceedings against the owner or owners of such dam or controlling works, wherever he is requested to do so by the department.

A metal minings and milling operation regulated under chapter 232, Laws of 1994, is subject to additional dam safety inspection requirements due to the specific hazards associated with failure of a tailings impoundment. The department shall inspect these impoundments at least quarterly during the project's operation and at least annually thereafter for the postclosure monitoring period in order to ensure the safety of the dam or controlling works. The department shall conduct additional inspections as needed during the construction phase of the mining operation in order to ensure the safe construction of the tailings impoundment.

RCW 90.03.470 Schedule of fees.

The following fees shall be collected by the department in advance:

- .
- .
- (8) For the inspection of any hydraulic works to insure safety to life and property, the actual cost of the inspection, including the expense incident thereto.
- (9) For the examination of plans and specifications as to safety of controlling works for storage of ten acre feet or more of water, a minimum fee of ten dollars, or the actual cost.

WASHINGTON STATE ADMINISTRATIVE RULES

DAM SAFETY REGULATIONS CHAPTER 173-175 WAC

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CHAPTER 173-175 WAC DAM SAFETY REGULATIONS

PART ONE - GENERAL

WAC 173-175-010 Purpose and Authority. These regulations provide for the comprehensive regulation and supervision of dams in order to reasonably secure safety to life and property pursuant to Chapters 43.21A, 43.27A, 86.16, 90.03, 90.28, and 90.54 RCW. The purposes of these regulations are to:

- (1) Designate the types of dams to which these regulations are applicable;
- (2) Provide for the design, construction, operation, maintenance and supervision of dams in a manner consistent with accepted engineering practice;
- (3) Establish and administer a program for permitting of construction work for new dams and for modifications of existing dams;
- (4) Establish a fee schedule based on dam size that will reflect the actual cost to the department of engineering review of plans and specifications and for construction inspections;
- (5) Establish the requirements and owner responsibilities for developing and executing plans for Operation and Maintenance, Owner Inspection and Emergency Actions; and
- (6) Encourage owners to establish a program for the Periodic Inspection of their projects.

WAC 173-175-020 Applicability. (1) These regulations are applicable to dams which can impound a volume of 10 acre-feet or more of water as measured at the dam crest elevation. The 10 acre-feet threshold applies to dams which can impound water on either an intermittent or permanent basis. Only water that can be stored above natural ground level and which could be released by a failure of the dam is considered in assessing the storage volume.

The 10 acre-feet threshold applies to any dam which can impound water of any quality, or which contains any substance in combination with sufficient water to exist in a liquid or slurry state at the time of initial containment.

(2) For a dam whose dam height is six feet or less and which meets the conditions of subsection (1) of this section, the department may elect to exempt the dam from these regulations.

The decision by the department to exempt a dam will be made on a case by case basis for those dams whose failure is not judged to pose a risk to life and minimal property damaged would be expected (Downstream Hazard Class 3).

(3) These regulations do not apply to dams that are, or will be, owned, by an agency of the Federal government which has oversight on operation and maintenance and has its own dam safety program for periodic inspection of completed projects. The department will continue to be the state repository for pertinent plans, reports and other documents related to the safety of Federally owned dams.

(4) These regulations do not apply to transportation facilities such as roads, highways or rail lines which cross watercourses and exist solely for transportation purposes and which are regulated by other governmental agencies.

Those transportation facilities which cross watercourses and which have been, or will be, modified with the intention of impounding water on an intermittent or permanent basis and which meet the conditions of subsection (1) of this section, shall be subject to these regulations.

(5) These regulations do not apply to dikes or levees constructed adjacent to or along a watercourse for protection from natural flooding or for purposes of floodplain management.

(6) These regulations do not apply to concrete or steel water storage tanks.

(7) These regulations do not apply to FERC licensed and to FERC exempted projects. The department will continue to maintain a repository for pertinent plans, reports, and other documents related to the safety of FERC licensed and FERC exempted projects.

WAC 173-175-030 Definitions. As used in this chapter:

"Acceptance" means acceptance by the department that the proposed plan(s) will satisfactorily address issues associated with proper operation, maintenance, inspection or emergency action.

"Approval" means approval by the department that the proposed design, plans and specifications conform to accepted engineering practice and department guidelines.

"Appurtenant Works" means such structures as outlet works and associated gates and valves; water conveyance structures such as spillways channels, fish ladders, tunnels, pipelines or penstocks; powerhouse sections; and navigation locks, either in the dam or adjacent thereto.

"Authorization" means written acknowledgement from the department to proceed with proposed actions.

"Construction change order" means a revision to the department approved plans and specifications that is initiated during construction.

"Construction permit" means the permit which authorizes construction and that the project's plans and specifications and construction inspection plan have been reviewed and approved by the department.

"Construction permit process" means the sequence of activities specified in WAC 173-175-110 inclusive, beginning with the application for construction permit and ending with the submission of a report summarizing construction records.

"Crest length" means the total horizontal distance measured along the axis of the dam, at the elevation of the top of the dam, between abutments or ends of the dam. Where applicable, this includes the spillway, powerhouse sections and navigation locks, where they form a continuous part of the impounding structure.

"Critical project element" means an element of a project whose failure could result in the uncontrolled release of the reservoir.

"Dam" means any artificial barrier and/or any controlling works, together with appurtenant works that can or does impound or divert water.

"Dam abutment" means that contact location at either end and beneath the flanks of a dam where the artificial barrier joins or faces against the natural earth or rock foundation material upon which the dam is constructed.

"Dam height" means the vertical distance from the natural bed of the stream or watercourse at the downstream toe of the impounding barrier to the maximum storage elevation. If the dam is not

across a stream or watercourse, the height is measured from the lowest elevation of the outside limit of the impounding barrier to the maximum storage elevation.

"Department" means the Department of Ecology.

"Design Step Level" means an integer value between one and ten used to designate increasingly stringent design loadings and conditions for design of critical project elements.

"Downstream Hazard Classification" means a rating to describe the potential for loss of human life and/or property damage if the dam were to fail and release the reservoir onto downstream areas. Downstream hazard classifications of 3, 2 and 1C, 1B, 1A correspond to low, significant and high downstream hazard classes respectively.

"Emergency condition" means a situation where life and property are at imminent risk and actions are needed within minutes or hours to initiate corrective actions and/or warn the public.

"Enlargement" means any modification of a project that will result in an increase in normal pool height and/or dam height.

"Exigency condition" means a situation where the dam is significantly underdesigned according to generally accepted engineering standards or is in a deteriorated condition and life and property are clearly at risk. Although present conditions do not pose an imminent threat, if adverse conditions were to occur, the situation could quickly become an emergency.

"FERC exempted project" means a project that is classified as exempt by the Federal Energy Regulatory Commission (FERC) under provisions of the Federal Power Act.

"FERC licensed project" means a project whose operation is licensed by the Federal Energy Regulatory Commission (FERC) under provisions of the Federal Power Act.

"Freeboard" means the vertical distance between the dam crest elevation and some reservoir level of interest below the dam crest.

"Hydrograph" means a graphical representation of discharge, stage, or other hydraulic property with respect to time for a particular location on a watercourse.

"Impounding barrier" means the structural element of the dam that has the primary purpose of impounding or diverting water. It may be constructed of natural and/or man-made materials.

"Incident" means the occurrence of any dam-related event where problems or conditions arise which may have posed a threat to the safety or integrity of the project or which may have posed a threat of loss of life or which resulted in loss of life.

"Inflow Design Flood (IDF)" means the reservoir inflow flood hydrograph used for sizing the spillways and for determining freeboard. It represents the largest flood that a given project is designed to safely accommodate.

"Maintenance" means those tasks generally accepted as routine in keeping the project and

appurtenant works in a serviceable condition.

"Maximum storage elevation" means the maximum attainable water surface elevation of the reservoir pool that could occur during extreme operating conditions. This elevation normally corresponds to the crest elevation of the dam.

"Miscellaneous construction elements" means a variety of construction elements or activities such as, but not limited to: reservoir linings; parapet walls or low berms for wave containment; minor reconstruction of isolated portions of the impounding barrier; internal drainage improvements; and erosion protection.

"Modification" means any structural alteration of a dam, its reservoir, spillway(s), outlet(s) or other appurtenant works that could significantly influence or affect the project safety.

"Normal pool height" means the vertical distance between the lowest point of the upstream toe of the impounding barrier and the normal storage elevation.

"Normal storage elevation" means the maximum elevation to which the reservoir may rise under normal operating conditions. Where the principal spillway is ungated, the normal storage elevation is usually established by the elevation of the spillway crest.

"100 year floodplain" means the area inundated during the passage of a flood with a peak discharge having a one percent chance of being equalled or exceeded in any given year at a specified location on a watercourse.

"Outlet" means a conduit and/or channel structure for the controlled release of the contents normally impounded by a dam and reservoir.

"Owner" means the person holding lawful title to the dam or any person who owns or proposes to construct a dam.

"Periodic inspection" means a detailed inspection of the dam and appurtenant works conducted on regular intervals and includes, as necessary, associated engineering analyses to confirm the continued safe operation of the project.

"Person" means any individual, firm, association, county, public or municipal or private corporation, agency, or other entity whatsoever.

"Plans and specifications" means the detailed engineering drawings and specifications used to describe the layout, materials, construction methods, etc., for assembling a project or project element. These do not include shop drawings or other drawings prepared by the construction contractor for temporary construction support systems.

"Population at risk" means the number of people who may be present in areas downstream of a dam and could be in danger in the event of a dam failure.

"Project" means a dam and its reservoir, either proposed or existing.

"Project engineer" means a professional engineer licensed in Washington, having direct supervision, as defined in WAC 196-24-095, in managing the engineering aspects of the project as representative of the owner.

"Reservoir" means any basin that contains or will contain the water impounded by a dam.

"Reservoir routing" means the procedures used to determine the attenuating effect of reservoir storage on a flood as it passes through a reservoir.

"Rule curve" means the rules and procedures used to regulate reservoir levels and project operation for various reservoir inflows and for both normal and unusual seasonal conditions.

"Significant enlargement" means any modification of an existing dam that results in the dam height or normal pool height being increased by an amount greater than 5.0 feet, and which also represents a ten percent or greater increase in dam height or normal pool height over that which existed prior to the modification.

"Spillway" means a channel structure and/or conduit for the safe release of water or floodwater.

"Stop work order" means an administrative order issued to temporarily halt construction work until a problem can be resolved.

"Substantially complete" means that a plan, action or project element requires only minor additions to be complete, and in its present state will perform the necessary functions for its intended use.

"Surficial inspection" means a visual inspection conducted to identify obvious defects or changed conditions.

WAC 173-175-040 Activities that Require Department Review, Approval, Acceptance, Authorization or Notification. (1) Activities related to the safety of dams that require review and approval by the department as detailed in this chapter include:

- (a) Construction of a new dam
- (b) Modification of an existing dam
- (c) Removal or abandonment of an existing dam
- (d) Construction Change Orders for project elements that could have an effect on public safety.

(2) Activities related to the safety of dams that require review and acceptance by the department as detailed in this chapter include:

- (a) Adoption of an operation and maintenance (O&M) plan;
- (b) Adoption of an emergency action plan (EAP);
- (c) Changes to existing operation and maintenance procedures or to an emergency action plan that could have an effect on public safety.

(3) Activities related to the safety of dams that require authorization from the department before proposed actions can proceed include:

- (a) Startup of construction: for a new dam; modifications to an existing dam; or removal or abandonment of an existing dam;
- (b) Initial controlled filling of a reservoir following new dam construction and

implementation of procedures for normal reservoir operation;

(c) Resumption of normal reservoir operation following dam modifications or emergency actions.

(4) Activities related to the safety of dams that require a notification to the department as detailed in this chapter include:

- (a) Change of dam ownership;
- (b) Advance notice of the startup of dam construction;
- (c) Declaration by the project engineer of project completion in accordance with the department approved plans and specifications and construction change orders;
- (d) Advance notice of periodic inspection; and
- (e) The occurrence of an incident at the dam.

WAC 173-175-050 Provision of Guidelines. (1) The department will develop and maintain *Dam Safety Guidelines* to aid dam owners and project engineers in complying with the department requirements in developing, producing or conducting:

- (a) Engineering design reports;
- (b) Plans and specifications;
- (c) Construction Inspection Plans ;
- (d) Operation and Maintenance Plans;
- (e) Periodic Inspections; and
- (f) Emergency Action Plans.

WAC 173-175-060 Change of Ownership. (1) When a change of ownership of a dam occurs, the new owner shall notify the department within 90 days following the transaction and provide:

- (a) The mailing address and telephone number where the owner can be contacted.
- (b) The name(s) and telephone number(s) of the individual(s) who will be responsible for operation and maintenance of the dam.

WAC 173-175-070 Effective Date. The effective date of Parts One through Five of this chapter shall be July 1, 1992. The effective date of Part Six of this chapter shall be January 15, 1993.

CONSTRUCTION PERMIT PROCESS

PART TWO

WAC 173-175-100 Construction Permit. (1) Any person intending to construct or modify any dam shall, before beginning said construction or modification, submit plans and specifications and a construction inspection plan for review and approval by the department.

(2) The approval of these documents will be indicated by the department's plan approval stamp on the cover sheet of the plans signed by the department's professional engineer who had primary responsibility for the engineering review.

(3) The return of the construction plans to the owner will be accompanied by a construction permit which authorizes construction and which must be prominently displayed at the construction site.

(4) A copy of the department approved plans and specifications shall be maintained at the construction site.

(5) Construction work shall not proceed until the plans, specifications and construction inspection plan have been approved by the department.

WAC 173-175-110 Sequence of Permitting Actions. The sequence of tasks to be completed by the owner or the project engineer and the actions taken by the department in permitting dam construction are outlined below. A more complete description of the required tasks, reports and plans are described in later sections, and additional guidance in meeting department requirements is contained in the department documents titled *Dam Safety Guidelines*.

The following outline is listed to give an overview of the normal sequence of actions for construction of a new dam. Subsections (9), (10) and (11) of this section will not be required for modification of an existing dam where the department has previously accepted the project's operation and maintenance manual and emergency action plan.

- (1) Submission of application for construction permit, including initial non-refundable fee payment
- (2) Submission of engineering design reports
- (3) Submission of plans and specifications
- (4) Payment of construction permit fee
- (5) Submission of construction inspection plan
- (6) Resolution of any outstanding engineering issues
- (7) Department approves plans and specifications and issues construction permit
- (8) Construction or modification of dam
- (9) Submission of Operation and Maintenance (O&M) plan
- (10) Submission of Emergency Action Plan (EAP)
- (11) Department accepts O&M Plan and EAP
- (12) Declaration by project engineer that project was constructed or modified in accordance with approved plans and specifications and construction change orders
- (13) Department concurs with project engineer that project was constructed or modified in accordance with approved plans and specifications and construction change orders
- (14) Department authorizes filling of reservoir at new dam or resumption of normal operations at existing dam
- (15) Submission of a report summarizing the construction records

WAC 173-175-120 Application for Construction Permit. (1) The department shall supply an application form to be used to initiate the process for obtaining the construction permit.

(2) The application form shall be submitted to the department at the time that the first substantive engineering information becomes available about the proposed project.

(3) An initial, non-refundable payment, which may represent all or a portion of the Construction Permit Fee, shall be included along with the application form. The amount of the initial construction permit fee payment is defined in WAC 173-175-390.

WAC 173-175-130 Engineering Design Reports. (1) Engineering design reports summarizing the various engineering investigations and pertinent project information are an important element of the project design documents. All pertinent engineering design reports that have been prepared during project formulation shall be submitted for review. The engineering design report(s) must bear the seal and signature of the project engineer.

(2) The engineering design reports shall be sufficiently complete so as to support the development of plans and specifications without substantial change or additional information.

(3) The engineering design report(s) shall be comprehensive in description of the various engineering investigations and analyses.

(a) For new project construction, the engineering design report(s) shall include, as a minimum, the items listed in subsection (4) of this section:

(b) For modifications of existing dams, the engineering design report(s) shall include, as a minimum, those items listed in subsection (4) of this section which represent changed conditions from original construction or which address items that have not been previously addressed in prior reports that were submitted to the department:

(4) Contents of Engineering Design Report(s):

(a) A description of the basic purposes of the project, normal operational characteristics and any unique or important design considerations associated with the site or project configuration.

(b) A description of the site geology, seismicity and geotechnical considerations including: a presentation of the findings from subsurface explorations based on test pits and/or boring logs; field tests; laboratory testing and classification of samples; and an identification of the seismotectonic provinces that could generate earthquakes large enough to significantly affect the project site.

(c) A description of the climatic and hydrologic characteristics of the site and tributary watershed including the computation of the inflow design flood and, where applicable, a listing of the input and output data for the computer model used to determine the inflow design flood.

(d) A listing of all sources of inflow to the reservoir.

(e) The size classification of the proposed project as defined by Table 1.

TABLE 1. DAM SIZE CLASSIFICATION

SIZE CLASSIFICATION	DAM HEIGHT
Small Dam	Less than 15 feet
Intermediate Dam	15 feet or greater but less than 50 feet
Large Dam	50 feet or greater

- (f) The reservoir operation classification of the proposed project as defined by Table 2.

TABLE 2. RESERVOIR OPERATION CLASSIFICATION

RESERVOIR OPERATION CLASSIFICATION	DETERMINING FACTOR
Permanent Pool or Seasonal Pool Operation	Steady state seepage or saturated flow conditions occur in impounding barrier and foundation at or near normal pool conditions.
Intermittent Operation	Duration of normal high pool condition is insufficient for steady state seepage or saturated flow conditions to develop in impounding barrier and foundation.

(g) An assessment of the consequences of dam failure on downstream areas, including:

- (i) An estimation of the magnitude of the dam break flood hydrographs resulting from hypothetical dam failures occurring with the reservoir at normal storage elevation and maximum storage elevation.
- (ii) A general description of the areas downstream of the dam that could be affected by floodwater from a dam failure;
- (iii) If there is the potential for loss of life, an inundation map delineating the maximum areal extent of flooding that could be produced by a dam failure. Inundation mapping should extend to a point downstream where the inundation from the dam failure is within the 100 year floodplain for the affected watercourse;
- (iv) The downstream hazard classification as defined by Table 3, which reflects the current conditions of development in downstream areas. The most serious potential consequences of failure of those listed in Columns 3A, 3B and 3C shall be used to establish the appropriate downstream hazard classification.

(h) Engineering calculations and data supporting the detailed design of project elements. This would include, as a minimum:

- (i) The design step levels used in design of the various critical project elements, based on guidance contained in the department's *Dam Safety Guidelines*.
- (ii) Stability analyses corroborating the design of the proposed embankment/barrier section under static and seismic loadings and rapid drawdown conditions;
- (iii) Calculations for the design of any hydraulic structures, which are subject to high lateral earth pressures, relatively large seismic loads and/or uplift pressures;
- (iv) Computations for sizing the principal and emergency spillway, including, where applicable, reservoir routing computations defining the reservoir inflow and outflow design flood hydrographs.

TABLE 3. DOWNSTREAM HAZARD CLASSIFICATION

DOWNSTREAM HAZARD POTENTIAL	DOWNSTREAM HAZARD CLASSIFICATION	COLUMN 3A POPULATION AT RISK	COLUMN 3B ECONOMIC LOSS GENERIC DESCRIPTIONS	COLUMN 3C ENVIRONMENTAL DAMAGES
Low	3	0	Minimal. No inhabited structures. Limited agriculture development.	No deleterious materials in reservoir contents
Significant	2	1 to 6	Appreciable. 1 or 2 inhabited structures. Notable agriculture or work sites. Secondary highway and/or rail lines.	Limited water quality degradation from reservoir contents and only short term consequences.
High	1C	7 to 30	Major. 3 to 10 inhabited structures. Low density suburban area with some industry and work sites. Primary highways and rail lines.	Severe water quality degradation potential from reservoir contents and long term effects on aquatic and human life.
High	1B	31-300	Extreme. 11 to 100 inhabited structures. Medium density suburban or urban area with associated industry, property and transportation features.	
High	1A	More than 300	Extreme. More than 100 inhabited structures. Highly developed, densely populated suburban or urban area with associated industry, property, transportation and community life line features.	

WAC 173-175-140 Plans and Specifications.

(1) Two copies of the plans and specifications, bearing the seal and signature of the project engineer, shall be submitted to the department for engineering review. Upon approval, one copy will be retained by the department and the other copy will be returned to the owner or the project engineer.

(2) For large or complex projects, one copy of the preliminary or intermediate level plans, in addition to the final plans, shall be submitted to the department for review.

(3) To be approved, the plans and specifications must contain sufficient detail to describe the proposed construction work.

(a) The following items, as a minimum, shall be included as part of the construction plans:

- (i) Project location and vicinity maps;
- (ii) Site map of dam, reservoir area and appurtenances;
- (iii) Sectional view along longitudinal axis of dam and foundation;
- (iv) Cross-sectional view of dam at location of maximum height;
- (v) Cross-sectional views and profiles of spillway(s), outlet facilities and other appurtenances;
- (vi) Steel reinforcement placement and bar sizing for concrete construction must be shown in at least one section or profile; and
- (vii) The plan for diversion and control of water during construction.

(b) The following items, as a minimum, shall be included as part of the construction specifications:

- (i) Type, class or description of all materials to be used;
- (ii) The requirements for fill placement, moisture conditioning and

minimum level of compaction of all earthen zones;

(iii) The requirements, procedures and minimum standards for concrete construction and/or structural details.

WAC 173-175-150 Construction Permit Fee. There is a fee for the review of plans and specifications and for construction inspections conducted by the department. The amount of the fee and owner requirements for fee payment are contained in WAC 173-175-350 through 173-175-400.

WAC 173-175-160 Review Standards. The department will review engineering design reports, plans and specifications and the construction inspection plan to ascertain that the proposed project will be designed and constructed in a manner which will reasonably secure safety to life and property.

(1) The department's review is intended to address issues of safety directly related to the structural stability and integrity of the completed project. The review is not intended to extend to more general issues of safety not directly related to the structural stability and integrity of the project which are the purview of other governmental agencies such as the Washington Department of Labor and Industries (L&I), which administers the Washington Industrial Safety and Health Act (WISHA).

(2) In addition to the above, the department will review documents submitted pursuant to this chapter to ascertain that they conform to accepted engineering and construction practice and are in conformance with guidance contained in the department's *Dam Safety Guidelines*.

(3) Those elements of a document(s) which are found not to be in conformance with the above will be identified to the owner or the project engineer and changes may be required as appropriate to conform to accepted engineering practice.

(4) Where differences of opinion arise on the suitability of certain engineering or construction practices and cannot be readily resolved, the burden of proof will rest on the owner and the project engineer to demonstrate the suitability of the proposed plan or action.

WAC 173-175-170 Construction Inspection Plan. (1) A detailed plan shall be submitted to the department describing how adequate and competent construction inspection will be provided.

(2) The Construction Inspection Plan shall be prepared by a professional engineer and shall bear his/her seal and signature.

(3) The Construction Inspection Plan shall include, as a minimum:

(a) A listing of construction activities related to critical project elements and planned inspection effort including staffing levels, responsibilities, frequency and duration of site visits;

(b) A description of the quality assurance testing program which describes the type of test, general frequency, acceptable results, handling of deficient materials and the individuals(s) responsible for overseeing the testing;

(c) Description of construction management organization, lines of communication and responsibilities;

(d) Description of the change order process including who is responsible for coordinating the change order review process with the department;

(e) Description of the technical records handling and the content and frequency of construction progress reports.

WAC 173-175-180 Issuance of Construction Permit. (1) After the department has

determined that the plans and specifications and construction inspection plan conform to accepted engineering practice, these documents will be approved and a construction permit will be issued which authorizes construction to commence.

Construction shall not commence until the Construction Permit has been issued by the department.

Preliminary work such as mobilization of equipment, stripping and grubbing and other site access and preparation work is allowed prior to receipt of the construction permit, provided no permanent features of the dam are initiated.

(2) Receipt of the construction permit does not relieve the owner of the responsibility to secure all other applicable permits and approvals before proceeding with construction work.

WAC 173-175-190 Construction Change Orders. (1) All dam projects subject to the provisions of these regulations shall be constructed in accordance with the plans and specifications approved by the department. Any proposed changes to the department-approved plans which could have an effect on structural integrity or safe operations of the project must first be presented to the department for a determination if an approval is required.

(2) If the department determines that the proposed construction change order represents a significant modification of the approved plans or specifications that could have an effect on structural integrity or safe operations of the project, then approval of the change order will be required.

The department will review the construction change order and provide a response to the project engineer in a timely manner, consistent with the complexity and safety concerns of the situation.

(3) If department approval of the proposed construction change order is required, no action can be taken by the owner to make the construction change until approval is given by the department.

WAC 173-175-200 Department Role in Construction Inspection. (1) It will be the department's role during construction to confirm that the project engineer, as representative for the owner, is properly implementing the department approved Construction Inspection Plan.

(2) The department will periodically observe the construction work to independently confirm that conditions assumed in the design stage are valid for field conditions and that construction is proceeding in accordance with the approved plans and specifications.

(3) Changes may be required by the department to be made to the approved plans and specifications to reasonably secure safety to life and property. Reasons for changes may include, but are not limited to the following:

- (a) To address unanticipated field conditions;
- (b) To correct omissions or errors in the approved plans and specifications;
- (c) To correct situations where the construction work clearly is not being performed in a workmanlike manner and does not, in the opinion of the department, meet the performance intent of the specifications.

(4) Where deemed necessary by the department, a stop work order may be issued to temporarily halt construction until a problem can be resolved.

WAC 173-175-210 Operation and Maintenance Plan. (1) An Operation and Maintenance (O&M) Plan shall be developed and submitted to the department for review and acceptance. The O&M Plan shall outline and summarize how the project is to be operated and how the basic elements of

monitoring, inspection and maintenance, as listed in WAC 173-175-500(1), are to be accomplished.

The department may issue an acceptance after determining the O&M Plan is substantially complete.

(2) Owners are responsible for incorporating the details of the O&M Plan into an O&M Manual suitable for use by dam operators. Requirements associated with O&M Manuals are listed in WAC 173-175-500.

WAC 173-175-220 Emergency Action Plan. (1) In those cases where a failure of the dam could pose a risk to life based on the current level of development in downstream areas (Downstream Hazard Classes 1A, 1B, 1C, and 2, WAC 173-175-130), an Emergency Action Plan (EAP) shall be developed and submitted to the department for review and acceptance. The purpose of the plan is to establish procedures for responding to unusual or emergency situations and procedures for detecting, evaluating, communicating and initiating notification or warning to individuals who may be at risk in downstream and upstream areas. Requirements associated with EAP's are listed in WAC 173-175-520.

The department may issue an acceptance after determining the EAP is substantially complete.

WAC 173-175-230 Declaration of Construction Completion. Within 30 days following substantial completion of construction or modification of a dam, the project engineer shall submit to the department:

A declaration stating the project was constructed in accordance with the department approved plans and specifications and construction change orders.

The department will provide a declaration form which may be used or altered, as appropriate, by the project engineer.

WAC 173-175-240 Authorization to Commence or Resume Project Operation. (1) Upon receipt of the project engineer's declaration of construction completion, the department will authorize the owner or the project engineer, as appropriate, to commence or resume normal project operation, provided that:

(a) The department concurs with the project engineer that the project was constructed in accordance with the approved plans and specifications and construction change orders.

(b) The proposed O&M plan is acceptable to the department;

(c) The proposed Emergency Action Plan, if required (see WAC 173-175-220), is acceptable to the department.

(2) If the above conditions are not met, the owner shall not commence or resume normal operation of the project until all outstanding issues or problems are resolved. When outstanding issues or problems are not resolved in a timely manner, the department may:

(a) Order the outlet works to remain fully open and not allow filling of the reservoir;

(b) Restrict reservoir water levels or reservoir operation;

(c) Order the breaching of the impounding barrier;

(d) Take other measures as appropriate to reasonably secure safety to life and property.

WAC 173-175-250 Construction Records Summary. Within 120 days following completion of construction or modification of a dam, the project engineer as representative of the owner, shall submit

a report to the department on construction activities which includes:

- (1) A summary of results from field testing of materials used in construction. The summary shall identify both representative values and the range of test values;
- (2) A discussion of any notable items encountered during construction.
- (3) One complete set of drawings depicting the as-built condition of the dam.

WAC 173-175-260 Exceptions to Construction Permit Process. If the department determines that emergency or exigency conditions exist at a dam and that it is in the best interests of public safety to expedite the construction or modification of a dam, the department may elect to temporarily suspend the normal construction permit process. To allow this exception, the department will issue a written conditional construction permit, which:

- (1) May initially be oral;
- (2) Will specify the construction activities to be allowed;
- (3) May be terminated at a time deemed appropriate by the department;
- (4) Shall incorporate, to the extent possible and not inconsistent with the situation, all applicable requirements of this chapter.

WAC 173-175-270 Department Review Response Time. In reviewing the various documents required in the construction permit process, the department shall respond in a timely manner to the owner or project engineer with written review comments, approval or acceptance as appropriate.

If the department response is anticipated to occur 60 days or more beyond the date of receipt of the document(s), the department shall notify the owner and/or project engineer in writing and advise them of the expected response date.

PART THREE

CONSTRUCTION PERMIT FEES

WAC 173-175-350 Authority for Construction Permit Fees. It is required by RCW 90.03.470(9) that fees be collected by the department for the examination of plans and specifications. The fee shall be a minimum of ten dollars or the actual cost. In addition, the department is required by RCW 43.21A.064(2) to inspect the construction of all dams. It is required by RCW 90.03.470(8) that fees be collected for the actual cost to the department for inspection including the expense incident thereto.

WAC 173-175-360 Construction Permit Fees for New Project Construction. Fees for the review of plans and specifications and for construction inspection for new project construction shall be the amounts shown in Table 4 as determined by the nearest values of dam height and crest length, in feet, which correspond to the project's planned dam height and crest length.

WAC 173-175-370 Construction Permit Fees for Modifications of Existing Dams. (1) Fees for the review of plans and specifications and for construction inspections for project modifications involving significant enlargements shall be the greater of five hundred dollars or the amount determined by those applicable percentages shown in Table 5A of the fees in Table 4. The appropriate Table 4 fee amount is to be determined using the nearest values of dam height and crest length, in feet, which correspond to the overall dimensions of the modified dam.

TABLE 4. CONSTRUCTION PERMIT FEES - NEW PROJECT CONSTRUCTION

DAM HEIGHT (FEET)	DAM CREST LENGTH (FEET)															
	50	100	150	200	250	300	350	400	500	600	700	800	1000	1500	2000	4000
400	15810	17640	18320	18730	19060	19320	19540	19730	20000	20000	20000	20000	20000	20000	20000	20000
300	13680	16220	17320	17890	18240	18500	18720	18920	19240	19500	19720	19920	20000	20000	20000	20000
250	12150	15100	16370	17190	17620	17980	18210	18400	18720	18990	19210	19400	19720	20000	20000	20000
200	10100	13260	15000	15890	16610	17130	17420	17690	18090	18350	18570	18770	19090	19670	20000	20000
180	8930	12370	14090	15250	15940	16530	17030	17280	17720	18060	18280	18470	18790	19380	19790	20000
160	7730	11390	13140	14340	15230	15790	16280	16720	17270	17620	17930	18140	18460	19050	19460	20000
150	7150	10840	12590	13800	14770	15400	15880	16310	17030	17380	17680	17950	18280	18870	19280	20000
140	6570	10080	12000	13250	14180	14990	15460	15880	16600	17120	17420	17680	18090	18670	19090	20000
130	6010	9260	11400	12620	13570	14340	15020	15430	16130	16720	17140	17400	17830	18460	18880	19880
120	5450	8400	10670	11950	12930	13680	14340	14930	15630	16210	16720	17090	17530	18240	18650	19650
110	4900	7560	9740	11250	12180	12990	13620	14180	15120	15680	16170	16600	17200	18000	18410	19410
100	4370	6740	8680	10300	11400	12170	12850	13410	14350	15110	15580	16000	16730	17630	18140	19140
95	4110	6330	8160	9760	11010	11740	12410	13010	13920	14720	15280	15690	16400	17430	18000	19000
90	3850	5930	7640	9140	10410	11320	11950	12530	13490	14260	14940	15360	16060	17230	17790	18320
85	3590	5530	7130	8530	9800	10820	11490	12050	13040	13780	14450	15030	15710	17020	17320	17320
80	3340	5140	6630	7930	9120	10160	11020	11560	12510	13300	13940	14520	15350	16320	16320	16320
75	3090	4760	6130	7340	8440	9460	10320	11060	11970	12780	13420	13980	14960	15320	15320	15320
70	2840	4380	5640	6750	7770	8700	9580	10320	11420	12190	12870	13430	14320	14320	14320	14320
65	2600	4010	5160	6180	7100	7960	8770	9530	10780	11580	12240	12830	13320	13320	13320	13320
60	2360	3640	4690	5610	6450	7230	7970	8660	9930	10950	11590	12150	12320	12320	12320	12320
55	2130	3280	4230	5060	5820	6520	7180	7800	8970	10010	10880	11320	11320	11320	11320	11320
50	1900	2930	3770	4520	5190	5820	6410	6960	8010	8970	9860	10320	10320	10320	10320	10320
46	1720	2650	3420	4090	4700	5270	5800	6310	7250	8120	8950	9520	9520	9520	9520	9520
42	1540	2380	3070	3670	4220	4730	5210	5660	6510	7290	8030	8720	8720	8720	8720	8720
38	1370	2110	2720	3260	3750	4200	4630	5030	5780	6480	7130	7760	7920	7920	7920	7920
34	1200	1860	2390	2860	3290	3690	4060	4410	5070	5680	6260	6800	7120	7120	7120	7120
30	1040	1600	2060	2470	2840	3180	3500	3810	4380	4910	5400	5870	6320	6320	6320	6320
28	960	1480	1900	2280	2620	2940	3230	3510	4040	4530	4980	5420	5920	5920	5920	5920
26	880	1360	1750	2090	2400	2690	2960	3220	3700	4150	4570	4970	5520	5520	5520	5520
24	820	1230	1590	1900	2190	2450	2700	2940	3380	3780	4170	4530	5120	5120	5120	5120
22	770	1120	1440	1720	1980	2220	2440	2660	3050	3420	3770	4090	4710	4720	4720	4720
20	710	1000	1290	1540	1770	1990	2190	2380	2730	3070	3370	3670	4220	4320	4320	4320
18	660	890	1140	1370	1570	1760	1940	2110	2420	2720	2990	3250	3740	3920	3920	3920
16	610	800	1000	1200	1370	1540	1700	1840	2120	2370	2620	2840	3270	3520	3520	3520
15	590	770	930	1110	1280	1430	1580	1710	1970	2210	2430	2640	3040	3320	3320	3320
14	570	730	860	1030	1180	1320	1460	1580	1820	2040	2250	2440	2810	3120	3120	3120
13	550	690	810	950	1090	1220	1340	1460	1680	1880	2070	2250	2580	2920	2920	2920
12	540	650	770	870	1000	1110	1230	1330	1530	1720	1890	2060	2360	2720	2720	2720
11	530	620	720	810	910	1010	1110	1210	1390	1560	1720	1870	2150	2520	2520	2520
10	520	590	670	760	830	910	1000	1090	1250	1400	1550	1680	1930	2320	2320	2320
9	510	560	630	700	770	830	900	970	1120	1250	1380	1500	1720	2120	2120	2120
8	500	540	590	640	710	760	810	860	980	1100	1210	1320	1510	1920	1920	1920
7	500	520	550	600	640	690	740	780	850	950	1050	1140	1310	1690	1720	1720
6	500	510	530	560	590	630	660	700	770	820	890	970	1110	1430	1520	1520
5	500	500	510	530	550	570	600	620	680	730	780	820	920	1180	1320	1320

(2) Fees for the review of plans and specifications and for construction inspection for project modifications not involving significant enlargements shall be the greater of five hundred dollars or the amount determined by those applicable percentages shown in Table 5B of the fees in Table 4. The appropriate Table 4 fee amount is to be determined using the nearest values of dam height and crest length, in feet, which correspond to the overall dimensions of the modified dam.

(3) Fees for the review of plans and specifications and for construction inspection for the removal or partial removal of a dam with safety deficiencies for the purpose of eliminating a public safety hazard shall be the minimum fee of ten dollars.

(4) Fees for the review of plans and specifications and for construction inspection for the planned abandonment and reclamation of dams and reservoir areas used in mining operations shall be the minimum fee of \$500.

TABLE 5 - FEES FOR MODIFICATIONS OF DAMS
MODIFICATION FEE AS PERCENTAGE OF FEE FOR NEW DAM CONSTRUCTION

FEATURES MODIFIED	TABLE 5A MODIFICATIONS INVOLVING SIGNIFICANT ENLARGEMENTS	TABLE 5B MODIFICATIONS NOT INVOLVING SIGNIFICANT ENLARGEMENTS
Spillway(s)	35%	25%
Impounding Barrier	35%	25%
Appurtenant Works and Miscellaneous Construction Elements	10%	10%

WAC 173-175-380 Maintenance. It will not be necessary to submit plans and specifications for review for routine maintenance, normal replacement or repair of items to keep them in a serviceable condition, seasonal removal or replacement of stoplogs, or other similar minor operational activities.

WAC 173-175-390 Payment of Construction Permit Fees. (1) The amount of the construction permit fee will be determined by the department based upon procedures contained in WAC 173-175-360 and WAC 173-175-370 and information contained in the construction plans.

(a) An initial payment, which may represent all or a portion of the construction permit fee shall be paid in conjunction with the submittal of the construction permit application described in WAC 173-175-120. The amount of the initial payment shall be:

(i) Ten dollars for the removal of a dam with safety deficiencies as described in WAC 173-175-370(3); or

(ii) Five hundred dollars for construction of a new dam or modification of an existing dam or project.

(b) The balance of the fee amount (less the initial payment above) is to be paid following notification by the department of the balance due.

(c) Fees for FERC licensed projects and FERC exempted projects are to be paid following notification by the department of the total amount due.

(d) All fees collected are non-refundable.

(2) No fee shall be required for the review of conceptual plans which describe proposed

repairs or improvements to existing dams to correct safety deficiencies. The normal construction permit process will apply at the time plans and specifications are submitted to the department.

(3) No additional fees shall be required for plan and specification changes and resubmittals required by the department as part of the review process.

(4) No additional fees shall be required for review of construction change orders.

WAC 173-175-400 Cost of Expert Opinion. In resolving differences of opinion on engineering issues between the department and project engineer or owner, it may be necessary for the department to employ an expert in dam design, analysis or construction.

(1) The expert who is chosen, the assigned tasks and the estimated cost for the expert's services shall be determined by negotiation between the owner and the department.

(2) The cost associated with employing the expert shall be paid by the owner of the proposed or existing project.

PART 4

PROJECT OPERATION

WAC 173-175-500 Operation and Maintenance. (1) The owner shall develop and maintain a current Operation and Maintenance (O&M) Manual.

The manual shall describe procedures for operation of the project under normal and extreme reservoir inflow conditions and provide technical guidance and procedures for monitoring, inspection and long term maintenance. Information on the development of the O&M manual is contained in the department's *Dam Safety Guidelines*. The O&M Manual shall include, as a minimum, the following items:

- (a) Identification of the individual(s) responsible for implementing the plan;
- (b) A project data sheet describing the pertinent features of the dam and reservoir, including the spillway(s), outlet works and appurtenant structures and their locations at the dam site;
- (c) The rules and procedures (rule curve) used to regulate reservoir levels and project operation for various reservoir inflows and for both normal and unusual seasonal conditions;
- (d) A description of each hydraulic element used to regulate or release water, including information on proper operation and scheduled maintenance;
- (e) A listing of the items requiring periodic monitoring, the frequency of monitoring and procedures for monitoring, measurement and record keeping;
- (f) A listing of the items requiring periodic maintenance and procedures for conducting and documenting maintenance and recording of problems;
- (g) A listing of items to be inspected or test operated the frequency and procedures for conducting the same and for documenting the findings.

(2) It shall be the duty and responsibility of the owner to, at all times, operate and maintain the dam and all appurtenant works in a safe manner and condition and follow the method and schedule of operation of the dam as outlined in the O&M manual.

(3) For dams constructed before July 1, 1992, owners are required to develop an O&M manual by December 31, 1997.

In those cases where a failure of the dam could pose a threat to life (Downstream Hazard Classes 1A, 1B, 1C and 2), the O&M Manual shall be submitted to the department for review and acceptance.

(4) Any proposed changes to the O&M manual which could have an effect on public or project safety must be submitted to the department for review and acceptance before implementation.

WAC 173-175-510 Inspection. (1) Owners are required to evaluate the safety of their dam(s) and all appurtenant works and to make modifications, as becomes necessary, to reasonably secure safety to life and property. To accomplish this, owners are:

(a) Required to conduct annual surficial inspections and to maintain records of their findings, including records of actions taken to correct problem conditions. Copies of such records shall be provided to the department upon request.

The annual surficial inspections may be conducted by the owner or by agent(s) designated by the owner.

(b) Encouraged to implement a program for the periodic inspection of their projects(s) on a five year frequency to be conducted by a professional engineer.

(c) Required to notify the department at least thirty days in advance of when periodic inspections are scheduled to allow department engineers to participate in the inspection.

(d) Required to submit a copy of the engineering report(s) and other documents which contain the findings, conclusions and recommendations resulting from the periodic inspection within 30 days following the completion of the various documents.

(2) In order to correct safety deficiencies and exigency conditions, owners are required to take actions and make modifications as prescribed by the department to preserve the structural stability and integrity of the project and attain levels of safety in accordance with accepted engineering practice.

(3) The department may elect to conduct periodic inspections of particular projects to reasonably secure safety to life and property.

(a) The department will give at least 30 days advance notice of the date of the periodic inspection and advise the owner of any requirements such as gates or valves that are to be operated during the inspection.

(b) Owners are required to develop an Operation and Maintenance Manual (WAC 173-175-500) and an Emergency Action Plan (WAC 173-175-520) within 180 days following completion of a periodic inspection conducted by the department.

WAC 173-175-520 Emergency Action. (1) In those cases where a failure of the dam could pose a threat to life (Downstream Hazard Classes 1A, 1B, 1C and 2), the owner shall develop and maintain an Emergency Action Plan (EAP) acceptable to the department.

(a) The EAP shall describe procedures for responding to unusual or emergency situations and procedures for detecting, evaluating, communicating, and initiating of notification or warning of individuals who may be at risk in downstream and upstream areas. Information on the development of an EAP is contained within the department's *Dam Safety Guidelines*.

(b) It shall be the duty and responsibility of the owner to implement the EAP when conditions warrant and to follow the method and schedule contained within the EAP.

(c) For dams constructed before July 1, 1992, owners are required to develop an EAP and to submit it to the department for review and acceptance by December 31, 1997.

(i) Owners are required to coordinate the development of the EAP with representatives from the local emergency services staff, state department of community development, emergency management division and appropriate local authorities.

(ii) Copies of the completed EAP must be provided to the State Emergency Management Division, local Emergency Services Office and to the department.

(2) Any proposed changes to the EAP which could have an affect on public or project safety must be submitted to the department for review and acceptance before implementation.

(3) Owners are required to exercise components of the EAP as needed to confirm the viability of the plan.

(4) The department will coordinate and solicit review comments from the local emergency services office and the state emergency management division on the acceptability of proposed EAPs. Those comments will constitute the primary basis for accepting or requesting modifications to a proposed EAP.

WAC 173-175-530 Reporting of Incidents. Owners are required to notify the department when incidents occur or when problems or conditions arise which may pose a threat to life or property or a threat to the integrity of the dam.

(1) The owner shall report by telephone to the department on any condition affecting the safety of the project or when an incident has occurred. The initial oral report must be made as soon as

practicable after the condition is discovered or following any incident.

(2) A written report may be required by the department within 30 days following the discovery of the condition or after the incident. The report shall describe the condition affecting the safety of the project or the incident which has occurred and shall describe the preliminary plans for correcting the condition and for preventing the recurrence of a similar incident.

PART FIVE

COMPLIANCE AND ENFORCEMENT

WAC 173-175-600 Right of Entry. The department or its duly appointed agent(s) shall have the right to enter at all reasonable times in or upon property, public or private, for the purpose of inspecting and investigating conditions relating to the construction, operation, maintenance or performance of dams. The department shall comply with the owner's reasonable rules for access to the project.

WAC 173-175-610 Emergencies. (1) When, in the opinion of the department, an emergency condition exists which poses an imminent threat to life, the department may take such action as necessary to eliminate or mitigate the hazard and potential consequences. The dam owner or the owner's agent(s) may be directed to take actions, and if that failing, the department may take control of the project and take actions, including, but not limited to:

- (a) Altering the operation of the project;
- (b) Lowering the reservoir water level;
- (c) Draining the reservoir;
- (d) Making emergency repairs or modifications to the project;
- (e) Enlisting the services of federal, state or local authorities to make emergency repairs or modifications to the project;
- (f) Breaching the dam.

(2) All costs incurred by the department as a result of taking control of the project will be charged to the owner.

WAC 173-175-620 Enforcement. (1) In enforcement of this chapter, the department may impose such sanctions as appropriate under authorities vested in it, including but not limited to, the issuance of regulatory orders under RCW 86.16.081 and 43.27A.190 and civil penalties under RCW 86.16.081 and 90.03.600.

(2) Any dam which is found to be under construction or recently constructed without prior approval of the plans and specifications is in violation of RCW 90.03.350 and will be presumed to be a public nuisance. The owner will not be allowed to fill the reservoir or continue to operate the reservoir until the structural integrity and safety of the facility can be demonstrated to the satisfaction of the department. In addition:

(a) Regulatory orders may be issued to enforce the restriction of reservoir filling and fines may be levied at \$100 per day up to an amount equal to 150% of the amount the owner would have been charged under the construction permit fee schedule listed in this chapter;

(b) Owners are required to submit as-built drawings and all available documentation describing the manner in which the dam or portion thereof was constructed;

(c) If the structural integrity and safety of a dam project cannot be demonstrated or confirmed to the satisfaction of the department, the owner shall not commence or resume normal operation of the project until all outstanding issues or problems are resolved to the satisfaction of the department. To accomplish the above, the department may:

(i) Order the outlet works to remain fully open and not allow filling of the reservoir;

- (ii) Restrict reservoir water levels or reservoir operation;
- (iii) Order the breaching of the impounding barrier;
- (iv) Take other measures as appropriate to reasonably assure safety to life and property.

(d) If, in the opinion of the department, the owner is unwilling or incapable of resolving the outstanding safety issues in a timely manner, the department may take action to have the dam abated as prescribed by law under RCW 90.03.350.

WAC 173-175-630 Appeals. All final written decisions of the department pertaining to permits, regulatory orders, and related decisions made pursuant to this chapter shall be subject to review by the pollution control hearings board in accordance with chapter 43.21B RCW.

